Claim Amendments

Please amend the claims as follows:

1. (currently amended) An apparatus for measuring at least one parameter of a fluid flowing within a pipe, comprising:

a spatial array of at least two sensors, disposed at different axial locations along the pipe, and each sensor measuring a parameter within the pipe at each corresponding axial location, each of said sensors providing a signal indicative of a parameter within the pipe at said axial location of a corresponding one of said sensors, each sensor including at least two sensing elements ~~dispose~~ disposed circumferentially at said corresponding axial location; and

a signal processor, responsive to said signals, which provides a signal indicative of the at least one parameter of the fluid in the pipe.

2. (currently amended) The apparatus of claim 1, wherein the at least two sensors are pressure sensors that provide a signal indicative of the unsteady pressure within the pipe, and wherein the sensing elements are pressure sensitive.

3. (original) The apparatus of claim 2, wherein the sensing elements of each pressure sensor are spaced circumferentially around the pipe at the corresponding axial location.

4. (original) The apparatus of claim 1 wherein each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within the pipe.

5. (currently amended) The apparatus of claim 1, wherein the signal processor, responsive to said pressure signals, provides a signal indicative of the speed of sound propagating through the ~~mixture~~ fluid in the pipe.

6. (original) The apparatus of claim 5 wherein said signal processor comprises logic, which calculates a speed at which sound propagates along said spatial array.

7. (original) The apparatus of claim 5 wherein said signal processor comprises logic, which calculates a frequency based signal for each of said acoustic pressure signals.

8. (original) The apparatus of claim 6 wherein said acoustic pressure signals each comprise a frequency based signal and wherein said signal processor comprises logic which calculates a ratio of two of said frequency based signals.

9. (currently amended) The apparatus of claim 1, wherein the spatial array comprises ~~comprising~~ at least three of said sensors.

10. (currently amended) The apparatus of claim 5 wherein the signal processor comprises logic which determines at least one of a vapor/liquid composition, the wetness or steam quality (volumetric phase fraction), the volumetric flow rate, the size of the liquid particles, the mass flow, the enthalpy, density, the velocity of the mixture in the pipe, and the speed of sound propagating through the mixture in the pipe.

11. (original) The apparatus of claim 1 wherein at least one of said pressure sensors measures strain on the pipe.

12. (currently amended) The apparatus of claim 5 wherein the frequency based sound speed is determined utilizing a dispersion model to determine the at least one parameter of the fluid. ~~mixture.~~

13. (currently amended) The apparatus of claim 5 wherein the array of acoustic sensors are spaced sufficiently such that the entire length of the array is at least a significant fraction of a ~~the~~ measured wavelength of the acoustic waves being measured.

14. (original) The apparatus of claim 1 wherein at least one sensor provides a first filter which measures a vortical pressure field at a first axial location along the pipe and provides a first pressure signal indicative of said vortical pressure field; and

at least a second sensor provides a second filter which measures said vortical pressure field at a second axial location along the pipe and provides a second pressure signal indicative of said vortical pressure field.

15. (currently amended) The apparatus of claim 1, wherein the signal processor, responsive to said ~~first and second pressure~~ signals indicative of a parameter within the pipe, provides a velocity signal indicative of a velocity of the said vortical pressure field moving in the pipe.

16. (original) The apparatus of claim 14, wherein said first and said second filters filter out wavelengths associated with an acoustic pressure field and passes wavelengths associated with said vortical pressure field.

17. (original) The apparatus of claim 16, wherein said first filter comprises a first spatial filter that includes at least a first and a second unsteady pressure sensors disposed a predetermined first distance apart from each other; and

said second filter comprises a second spatial filter that includes at least a third and a fourth unsteady pressure sensors disposed a predetermined second distance apart from each other.

18. (original) The apparatus of claim 1, wherein the sensing elements are a piezoelectric film sensor.

19. (currently amended) The apparatus of claim 1, wherein the ~~pressure~~ sensors are clamped onto the pipe.

20. (original) The apparatus of claim 1, wherein each sensor measures a pressure produced by a vortical disturbance in the fluid.

21. (currently amended) The apparatus of claim 14, wherein the signal processor defines a convective ridge to determine the at least one parameter of the ~~mixture.~~ fluid.

22. (currently amended) The apparatus of claim 14, wherein the at least one parameter of the fluid ~~mixture~~ is the volumetric flow rate.

23. (currently amended) The apparatus of claim 21, wherein the at least one parameter of the fluid ~~mixture~~ is the volumetric flow rate.

24. (original) The apparatus of claim 1, wherein the sensors are disposed in the pipe and in contact with the fluid.

25. (original) An apparatus for determining internal pressure changes of a medium flowing in a pipe, comprising:

at least one sensor for coupling to an outer surface of a pipe by a coupling arrangement, responsive to radial expansion and contraction of the pipe caused by internal pressure changes of a medium flowing therein, for providing a sensor signal containing information about the radial expansion and contraction of the pipe;

a processor module, responsive to the sensor signal, for providing a processor module signal containing information about the internal pressure changes of the medium flowing in the pipe.

26. (original) The apparatus according to claim 25, wherein the at least one sensor includes a plurality of sensors.

27. (original) The apparatus according to claim 26, wherein the plurality of sensors are arranged axially along the length of the pipe.

28. (original) The apparatus according to claim 27, wherein the plurality of sensors are also circumferentially arranged around the pipe.

29. (original) The apparatus according to claim 25, wherein the at least one sensor includes a strain sensor.

30. (original) The apparatus according to claim 25, wherein the at least one sensor includes a spring element in the form of a diaphragm that is coupled capacitively to another surface of a transducer so that pipe radial growth causes a displacement in the diaphragm which is sensed as a change in capacitance between the diaphragm and the other surface.

31. (original) The apparatus according to claim 25, wherein the coupling arrangement is an outer strap and the at least one sensor is loaded against the outer surface of the pipe by the outer strap.

32. (original) The apparatus according to claim 31, wherein the apparatus includes either a mechanical link arranged between the at least one sensor and the outer surface of the pipe, a block arranged between the at least one sensor and the outer strap. or a combination thereof.

33. (currently amended) The apparatus according to claim 25, wherein the at least one sensor includes ~~is~~ a piezoelectric or magnetostrictive structure which provides a voltage or charge when strained.

34. (original) The apparatus according to claim 25, wherein the at least one sensor include two strain sensors diametrically opposed on the outer surface of the pipe to compensate for bending modes caused by the flexing of the pipe.

35. (original) The apparatus according to claim 25, wherein the at least one sensor include a multiplicity of strain sensors arranged equi-distantly around the outer surface of the pipe to filter or compensate for bending modes caused by the flexing of the pipe.

36. (original) The apparatus according to claim 25, wherein the at least one sensor is affixed directly to the outer surface of the pipe.

37. (original) The apparatus according to claim 25, wherein the at least one sensor include a multiplicity of strain sensors separated from one another by a distance d.

38. (original) The apparatus according to claim 25, wherein the at least one sensor includes an accelerometer.

39. (original) The apparatus according to claim 25, wherein the processor module determines a flow rate of the medium flowing in the pipe based on the information about the internal pressure changes of the medium flowing in the pipe.

40. (original) The apparatus according to claim 25, wherein the processor module determines a composition of the medium flowing in the pipe based on the information about the internal pressure changes of the medium flowing in the pipe.